Gilles Consulting
Brian K. Gilles
425-822-4994

EVALUATION OF TREES AT THE UPS PARKING LOT EXPANSION At the Southeast Corner of the Intersection of NE Union Hill Road & 185th Avenue NE Redmond, WA 98052

January 30, 2019

PREPARED FOR:

Jim Harper, PE, Senior Project Manager
Cardno
5415 SW Westgate Drive
Suite 100
Portland, OR 97221

PREPARED BY:

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CONTENTS

EXECUTIVE SUMMARY

A total of 30 trees were evaluated on the site. They can be summarized as follows:

VIABILITY SUMMARY		
# of Trees	**Health**	**%**
30	Viable	100%
0	Non-Viable	0%
30	**Total:**	**100%**

STATUS SUMMARY		
# of Trees	**Status**	**%**
3	Non-Significant	9.7%
27	Significant	87.1%
30	**Total:**	**96.8%**

ASSIGNMENT

Jim Harper, Senior Project Manager for Cardno, contracted with Gilles Consulting to evaluate the trees at United Parcel Service, (UPS), at southeast corner of NE Union Hill Road and 185th Avenue NE in Redmond, Washington. The property is being re-developed into a parking lot and the City of Redmond requires an analysis of the trees as part of the permit process. This report provides the analysis. The information in this report *must* be utilized to create a Tree Retention/Preservation Plan as required by Redmond Code.

METHODOLOGY

To evaluate the trees, as well as to prepare this report, I drew upon my 30+ years of experience in the field of arboriculture and my formal education in natural resources management, dendrology, forest ecology, plant identification, and plant physiology. I followed the protocol of the International Society of Arboriculture (ISA) for tree risk assessment. Published in 2011, the *Best Management Practices, Tree Risk Assessment, ANSNI A300 Part 9* was developed to aid in the interpretation of professional standards and guide work practices based upon current science and technology. Using this process, now called the *Tree Risk Assessment Qualification,* or TRAQ for short, I performed a Level Two assessment which included looking at the overall health of the tree as well as the site conditions. This is a scientifically based process to look at the entire site, surrounding land and soil, as well as a complete look at the threes themselves.

In examining each tree, I looked at such factors as: size, vigor, canopy and foliage condition, density of needles, injury, insect activity, root damage and root collar health,

crown health, evidence of disease-causing bacteria, fungi or virus, dead wood and hanging limbs.

Tree Tags

The trees were tagged and numbered 461 through 486 and 131. The tags are made of shiny aluminum approximately one inch by three inches in size and are attached to the tree with staples and a one foot strip of brightly colored survey tape. The tags were placed as high as possible to minimize their removal and were generally placed on the backsides of the trees as inconspicuously as possible. Please refer to *Attachment 1, Site Survey* for an orientation to the site and the approximate location of the trees.

Missing Trees

There were a few trees that were not included on the survey. They were labeled with the next number in the sequence and then their approximate location was indicated on the included site plan. These trees may need to be surveyed to determine their exact location in relation to the proposed site improvements and their retainability.

OBSERVATIONS

The property is bounded to the north by NE Union Hill Road, to the west by 185th Avenue NE, to the east by a King County Metro Ride-Share parking lot, and to the south by a fence company. The majority of the property is a gently sloping grass field that slopes up from the northwest corner upwards to the east property line. These elevations rise from approximately 66 feet up to approximately 75 feet in elevation. In the southern portion of the property there is a sharp mound and a gully right along the south property line.

Photo # 1: A screen shot from the King County Assessor's website showing the property on a 2015 aerial photo with the property lines approximately super-imposed. Note the five trees along NE Union Hill Road and the cluster of 25 trees near the south property line.

There 30 trees are on the property are in two locations. There are five installed trees along NE Union Hill Road. The other 25 trees are on the mound and in the gully in the southern portion of the property.

Photo # 2: Looking north from near the base of the mound at the gently sloping majority of the lot.

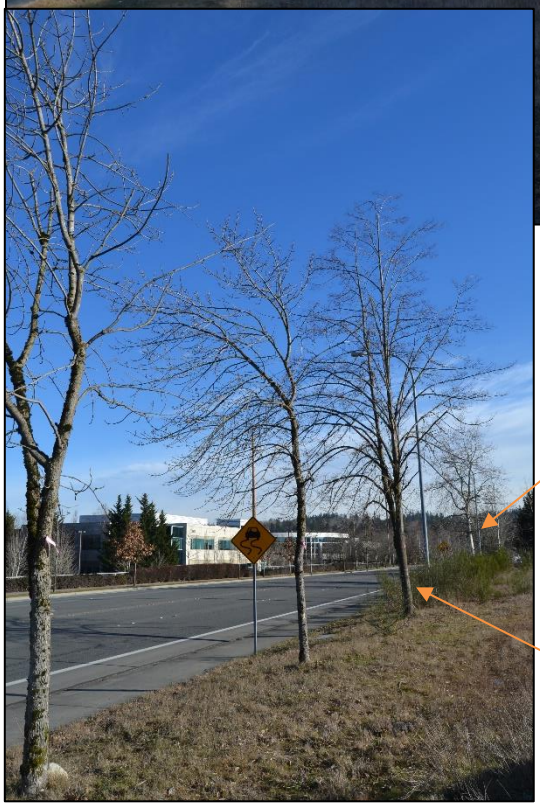


Photo # 3: Looking east along the north property line at the row of five trees along NE Union Hill Road. Two of the five trees are *Significant.* They are

Tree # 131, and

.Tree # 485

Photo # 4: Looking NE from the 185th Avenue NE sidewalk at the trees on the south portion of the property. The end of the chain link fence is the approximate property corner.

Photo # 5: Looking at trees 467 – 479 on the mound.

In an effort to present the information and conclusions for each tree in a manner that is clear and easy to understand, as well as to save paper, I have included a detailed spreadsheet, *Attachment 2, Tree Inventory/Condition Spreadsheet*. All the same information from the ISA Tree Hazard Form is included in this spreadsheet and the attached glossary. The descriptions on the spreadsheet were left brief in order to include as much pertinent information as possible and to make the report manageable. The

attached glossary provides a detailed description of the terms used in the spreadsheet and in this report. It can be found in *Attachment 3, Glossary*. A brief review of these terms and descriptions will enable the reader to rapidly move through the spreadsheet and better understand the information.

Additional Testing

None of the trees presented symptoms or signs that would indicate internal decay or structural defects. Therefore, no additional tests were performed during this site visit.

DISCUSSION AND CONCLUSIONS

Right-of-Way Trees

There are no right-of-way trees impacted by this proposed project.

Trees on Adjacent Properties

There are trees planted south of the south property line and east of the east property line. These are landscape trees installed for landscape purposes. They can all be adequately protected with *Tree Protection Fencing* placed five feet north of the south property line, and five feet west of the east property line.

Photo # 6: Looking at landscape trees east of the east property line. Just behind the fence one can just make out several vans parked in the lot. These trees can all be adequately protected with *Tree Protection Fencing* placed five feet west of the east property line.

Trees on the Subject Property

As noted above there are 30 trees on the subject property. All 30 trees are rated as Fair, Good, Very Good, or Excellent. Therefore, they are all *Viable.* Three trees while *Viable,* measure less than 6.0 inches at the standard 4.5 feet above the average ground level. Therefore, they are *Non-Significant.* They are tree #'s 483, 484, and 486. All three are in the row of landscape trees near the north property line along NE Union Hill Road.

The remaining 25 trees are in the south of the property. Trees 461 through 466 are along the ditch near the south property line. Trees 467 through 482 are on the mount.

Required Tree Retention

The City of Redmond requires that 100% of all *Landmark Trees* and 35% of all *Significant Trees* be retained. There are 27 *Significant Trees* on this lot. Thirty five percent would be 9.45, rounded to 9 *Significant Trees* are the minimum required amount of trees.

Tree Protection Measures

In order for trees to survive the stresses placed upon them in the construction process, tree protection must be planned in advance of equipment arrival on site. If tree protection is not planned integral with the design and layout of the project, the trees will suffer needlessly and possibly die. With proper preparation, often costing little or nothing extra to the project budget, trees can survive and thrive after construction. This is critical for tree survival because damage prevention is the single most effective treatment for trees on construction sites. Once trees are damaged, the treatment options available are limited.

The minimum Tree Protection Measures in *Attachment 4, Tree Protection Measures* are on three separate sheets that can be copied and introduced into all relevant documents such as site plans, permit applications and conditions of approval, and bid documents so that everyone involved is aware of the requirements. These Tree Protection Measures are intended to be generic in nature. They will need to be adjusted to the specific circumstances of your site that takes into account the location of improvements and the locations of the trees.

WAIVER OF LIABILITY

There are many conditions affecting a tree's health and stability, which may be present and cannot be ascertained, such as, root rot, previous or unexposed construction damage, internal cracks, stem rot and more which may be hidden. Changes in circumstances and conditions can also cause a rapid deterioration of a tree's health and stability. Adverse weather conditions can dramatically affect the health and safety of a tree in a very short amount of time. While I have used every reasonable means to examine these trees, this

evaluation represents my opinion of the tree health at this point in time. These findings do not guarantee future safety nor are they predictions of future events.

The tree evaluation consists of an external visual inspection of an individual tree's root flare, trunk, and canopy from the ground only unless otherwise specified. The inspection may also consist of taking trunk or root soundings for sound comparisons to aid the evaluator in determining the possible extent of decay within a tree. Soundings are only an aid to the evaluation process and do not replace the use of other more sophisticated diagnostic tools for determining the extent of decay within a tree.

As conditions change, it is the responsibility of the property owners to schedule additional site visits by the necessary professionals to ensure that the long-term success of the project is ensured. It is the responsibility of the property owner to obtain all required permits from city, county, state, or federal agencies. It is the responsibility of the property owner to comply with all applicable laws, regulations, and permit conditions. If there is a homeowners association, it is the responsibility of the property owner to comply with all Codes, Covenants, and Restrictions (CC&R's) that apply to tree pruning and tree removal.

This tree evaluation is to be used to inform and guide the client in the management of their trees. This in no way implies that the evaluator is responsible for performing recommended actions or using other methods or tools to further determine the extent of internal tree problems without written authorization from the client. Furthermore, the evaluator in no way holds that the opinions and recommendations are the only actions required to insure that the tree will not fail. A second opinion is recommended. The client shall hold the evaluator harmless for any and all injuries or damages incurred if the evaluator's recommendations are not followed or for acts of nature beyond the evaluator's reasonable expectations, such as severe winds, excessive rains, heavy snow loads, etc.

This report and all attachments, enclosures, and references, are confidential and are for the use of the client concerned. They may not be reproduced, used in any way, or disseminated in any form without the prior consent of the client concerned and Gilles Consulting.

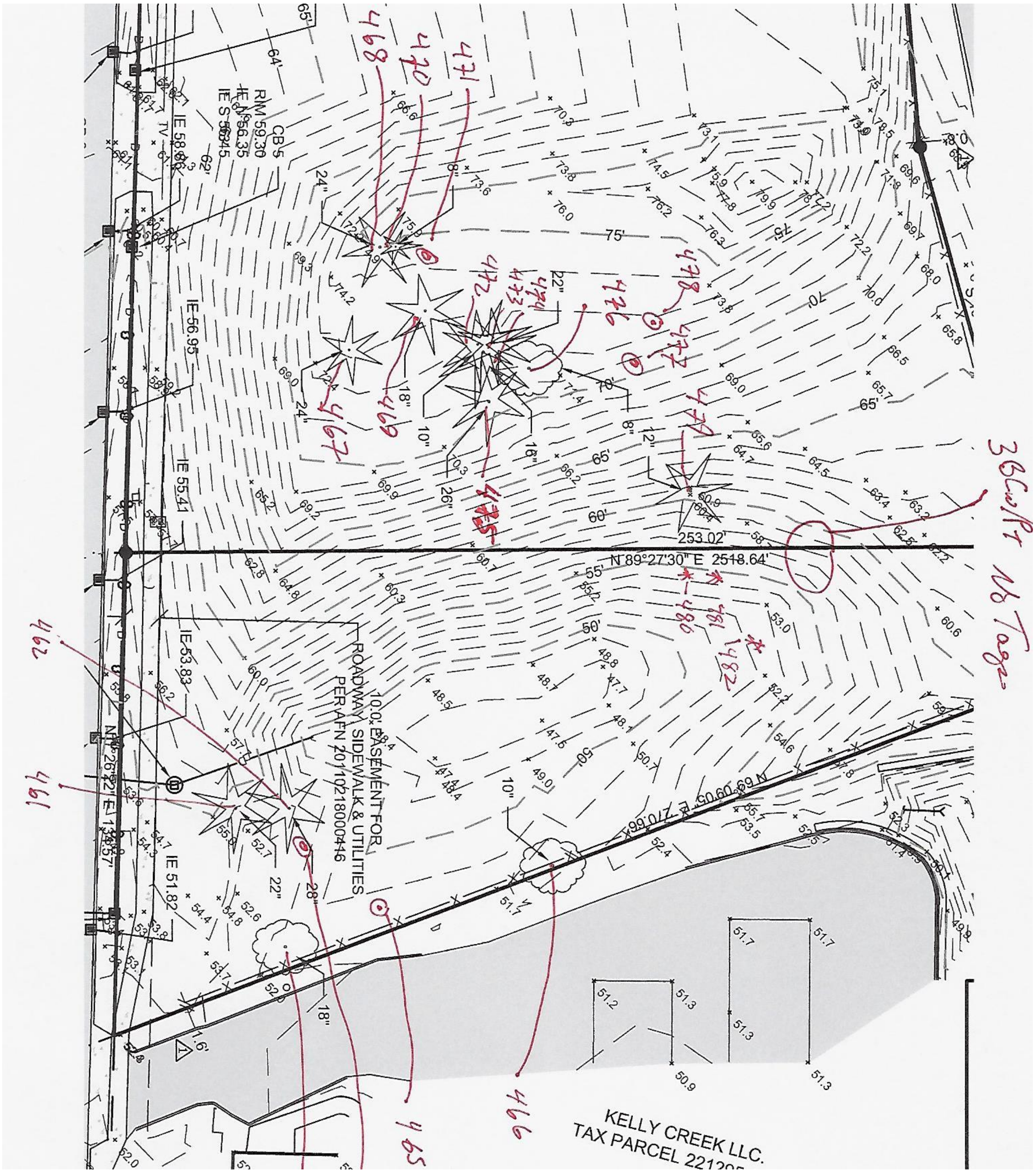
Thank you for calling Gilles Consulting for your arboricultural needs.

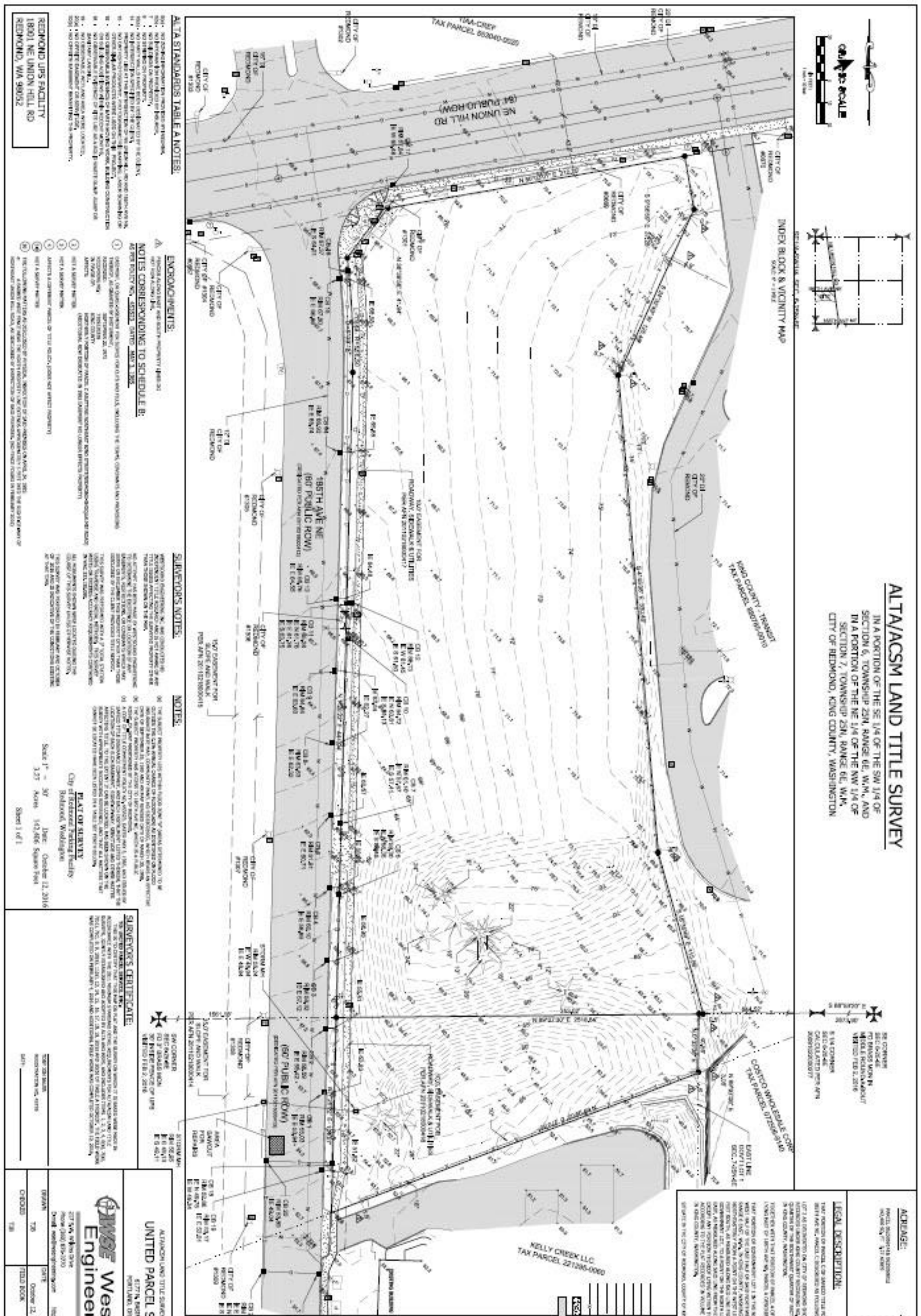
Sincerely,

Brian K. Gilles, Consulting Arborist
ISA Certified Arborist # PN-0260A
ASCA Registered Consulting Arborist # RCA-418
ISA TRAQ Qualified
ISA TRAQ Certified Instructor

ATTACHMENTS

ATTACHMENT 1 - TOPOGRAPHIG SURVEY WITH TREE #'S


KELLY CREEK LLC.
10.0' EASEMENT FOR
ROADWAY, SIDEWALK & UTILITIES
PER AFN 20110218000446
N 89°27'30" E 2518.64'
253.02'


ALTA/ACSM LAND TITLE SURVEY
IN A PORTION OF THE SE 1/4 OF THE SW 1/4 OF SECTION 6, TOWNSHIP 25N, RANGE 6E, W.M., AND IN A PORTION OF THE NE 1/4 OF THE NW 1/4 OF SECTION 7, TOWNSHIP 25N, RANGE 6E, W.M., CITY OF REDMOND, KING COUNTY, WASHINGTON
NE UNION HILL RD
185TH AVE NE
REDMOND UPS FACILITY
18001 NE UNION HILL RD
REDMOND, WA 98052
UNITED PARCEL SERVICE, INC.
WestSound Engineering, Inc
ALTA STANDARDS TABLE A NOTES:
ENCROACHMENTS:
SURVEYOR'S NOTES:
NOTES:
SURVEYOR'S CERTIFICATE:
LEGAL DESCRIPTION:
LEGEND:
ACREAGE:

ATTACHMENT 2 - TREE INVENTORY/CONDITIONS SPREADSHEET

#1	***Property:*** Whether the tree is on or off the Subject Property, or a Right-of-Way tree	
#2	***Tree Location:*** Relative placement of the tree on the Subject Property.	
#3	***Tree #:*** The unique tag number of each tree.	
#4	***Species:***	
	BCw/Pt	Black Cottonwood, Populus trichocarpa
	BLM/Am	Big Leaf Maple, *Acer macrophyllum*
	DF/Pm	Douglas Fir, *Pseudotsuga menziezii*
	PDw/Cn	Pacific Dogwood, *Cornus nuttallii*
	PW/Sl	Pacific Willow, *Salix lasiandra*
	RA/FoR	Raywood Ash, *Fraxinus oxycarpa (angustifolia) 'Raywood'*
	Unk Dec	Unknown deciduous
	WbHB/Bj	Whitebark Himalayan Birch, *Betula jacquemontii*
	WP/Pa	White Poplar, *Populus alba*
#5	***DBH:*** Trunk diameter @ 4.5' above average ground level.	
#6	***Drip Line:*** The radius, the distance from the trunk to the furthest branch tips.	

#7	***Limits of Disturbance:*** The boundary between the area of minimum protection around a tree and the allowable site disturbance as determined by a qualified professional.
#8	***LCR:*** *Live Crown Ratio* - the amount of live canopy expressed as a % of the entire tree height
#9	***Symmetry:*** General shape of canopy and weight distribution of the tree around the trunk.
#10	***Foliage:*** General description of foliage density that indicates tree health and vigor.
#11	***Crown Condition:*** The most important external indication of tree health and vigor.
#12	***Trunk:*** Description of trunk condition or abnormalities if any.
#13	***Root Collar:*** The base of the tree where the trunk flares into the roots--deformities or problems are noted here.
#14	***Roots:*** Root problems are noted here.
#15	***Comments:*** Additional observations about the tree's condition.
#16	***Status:*** A "Significant Tree" is any healthy and structurally sound tree that measures between 6.0 and 29.9 inches at 4.5 feet above the average ground level. A "Landmark Tree" is any healthy structurally sound tree that is 30.0 inches diameter or more.
#17	***Current Health Rating:*** A description of general health ranging from dead, dying, poor, fair, good, very good, to excellent.
#18	***Viability***: A Significant or Landmark Tree that is in good health with a low risk of failure due to structural defects, is relatively wind firm if isolated or remains as part of a grove. Generally trees rated as Fair, Good, Very Good, or Excellent are Viable Trees.
#19	***Recommendation:*** This is an estimate of whether or not the tree is of sufficient health, vigor, and structure to consider retaining.

1	2	3	4	5	6	7 -- LIMITS OF DISTURBANCE				8	9	10	11	12	13	14	15	16	17	18	19
PROPERTY	TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	STATUS	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
Subject property	SW Prop. Corner	461	DF/Pm	22.7"	24'	29'	29'	29'	29'	95%	Min. asym.	Dense	Average	Straight	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	SW Prop. Corner	462	DF/Pm	25.9"	22'	27'	27'	27'	27'	95%	Min. asym.	Dense	Healthy	Straight	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	S. Prop. Line Fence	463	DF/Pm	12.5"	20'	25'	25'	25'	25'	85%	Min. asym.	GBS/GSE	Healthy	Typical	NAD	-	Tag tied to fence.	Significant	Very good	Viable	Potential to retain with Tree Protection Measures

1	2	3	4	5	6	7 -- LIMITS OF DISTURBANCE				8	9	10	11	12	13	14	15	16	17	18	19
PROPERTY	TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	STATUS	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
Subject property	S. Prop. Line Fence	464	WP/Pa	8.0"	10'	15'	15'	15'	15'	65%	Maj. asym.	ABS/ASE	Average	Typical	NAD	-	Tag tied to fence.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Subject property	S. Prop. Line Fence	465	PW/Sl	9.0"	14'	19'	19'	19'	19'	60%	Maj. asym.	ABS/ASE	Average	Fork at 7', Typical	NAD	-	Tag tied to fence. Base is next to the ditch.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Subject property	S. Prop. Line Fence	466	PW/Sl	11.0"	16'	21'	21'	21'	21'	75%	Gen. sym.	GBS/GSE	Healthy	Fork at Base	Fill against Base	Fill on 50%	Tag tied to fence. Fence is against trunk.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	467	DF/Pm	23.9"	16'	21'	21'	21'	21'	98%	Gen. sym.	Dense	Healthy	Straight	NAD	-	Unusually heavy cone crop.	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	468	DF/Pm	28.9"	20'	25'	25'	25'	25'	70%	Gen. sym.	Average	Average	Straight	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	469	DF/Pm	18.8"	14'	19'	19'	19'	19'	85%	Gen. sym.	Average	Healthy	Straight	NAD	-		Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	470	DF/Pm	8.6"	7'	12'	12'	12'	12'	25%	Maj. asym.	Thin	Weak	Straight	NAD	-		Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	471	PDw/Cn	6.1"	12'	17'	17'	17'	17'	90%	Maj. asym.	ABS/ASE	Weak	Serpentine	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures

1	2	3	4	5	6	7 -- LIMITS OF DISTURBANCE				8	9	10	11	12	13	14	15	16	17	18	19
PROPERTY	TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	STATUS	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
Subject property	On the Mound	472	DF/Pm	10.0"	12'	17'	17'	17'	17'	70%	Maj. asym.	Average	Weak	Leans West	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	473	DF/Pm	22.2"	22'	27'	27'	27'	27'	80%	Min. asym.	Dense	Regen - Healthy	Kink at 18'	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	474	DF/Pm	25.7"	22'	27'	27'	27'	27'	85%	Min. asym.	Dense	Healthy	Straight	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	475	BCh/Pe	14.2"	20'	25'	25'	25'	25'	90%	Min. asym.	GBS/GSE	Healthy	Fork at Base	NAD	-	Clump of five. Possible Harp Tree. Trunk diameters are 9.3", 6.7, 6.7, 4.2, 3.5" =single trunk of 14.2 inches.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	476	BCh/Pe	6.1"	14'	19'	19'	19'	19'	80%	Min. asym.	GBS/GSE	Healthy	Slight Lean East	Partially exposed	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	477	BCh/Pe	6.2"	14'	19'	19'	19'	19'	75%	Maj. asym.	GBS/GSE	Healthy	Serpentine	Partially exposed			Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	478	DF/Pm	12.5"	16'	21'	21'	21'	21'	98%	Gen. sym.	Dense	Healthy	Straight	NAD		Tag tied to limb on north side.	Significant	Excellent	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	479	DF/Pm	10.6"	16'	21'	21'	21'	21'	75%	Gen. sym.	Dense	Healthy	Straight	NAD	-		Significant	Excellent	Viable	Potential to retain with Tree Protection Measures

1	2	3	4	5	6	7 -- LIMITS OF DISTURBANCE				8	9	10	11	12	13	14	15	16	17	18	19
PROPERTY	TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	STATUS	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
Subject property	On the Mound	480	DF/Pm	7.2"	10'	15'	15'	15'	15'	70%	Min. asym.	Average	Average	Straight	NAD	-		Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	481	BCw/Pt	8.2"	12'	17'	12'	12'	12'	75%	Gen. sym.	ABS/ASE	Healthy	Fork at 2'	NAD	-	Two trunks measure 7.8" & 2.4" = single trunk of 8.2 inches.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	No Tag	BCw/Pt	Est. 16.5"	20'	25'	25'	25'	25'	90%	Gen. sym.	GBS/GSE	Healthy	Fork at 12'	NAD	-	Surrounded by dense Himalayan Blackberries.	Significant	Excellent	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	No Tag	BCw/Pt	Est. 8.5"	10'	15'	15'	15'	15'	80%	Min. asym.	GBS/GSE	Healthy	Serpentine	NAD	-	Surrounded by dense Himalayan Blackberries.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	No Tag	BCw/Pt	Est. 12.0"	16'	21'	21'	21'	21'	90%	Gen. sym.	GBS/GSE	Healthy	Slight Lean SE, Serpentine	NAD	-	Surrounded by dense Himalayan Blackberries.	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	On the Mound	482	DF/Pm	13.9"	16'	21'	21'	21'	21'	98%	Gen. sym.	Dense	Healthy	Straight	NAD	-		Significant	Excellent	Viable	Potential to retain with Tree Protection Measures
Subject property	Union Hill Road	483	RA/FoR	5.6"	10'	To the Side walk	15'	10'	10'	70%	Gen. sym.	GBS/GSE	Average	Fork at 5'	NAD	-	Base is app. 6 feet south of south side of sidewalk.	Non-Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	Union Hill Road	484	RA/FoR	5.5"	10'	To the Side walk	15'	10'	10'	60%	Maj. asym.	ABS/ASE	Average	Serpentine	NAD	-	Base is app. 6 feet south of south side of sidewalk.	Non-Significant	Fair	Viable	Potential to retain with Tree Protection Measures

1	2	3	4	5	6	7 -- LIMITS OF DISTURBANCE				8	9	10	11	12	13	14	15	16	17	18	19
PROPERTY	TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	STATUS	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
Subject property	Union Hill Road	131	Unk Dec	9.7"	18'	To the Side walk	23'	23'	23'	85%	Gen. sym.	GBS/GSE	Healthy	Fork at 7', Typical	NAD	-	Base is app. 6 feet south of south side of sidewalk.	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Subject property	Union Hill Road	485	WbHB/ Bj	12.6"	16'	To the Side walk	21'	21'	21'	80%	Gen. sym.	GBS/GSE	Healthy	Serpentine	NAD	-	Base is app. 6 feet south of south side of sidewalk.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
Subject property	Union Hill Road	486	WbHB/ Bj	5.6"	11'	To the Side walk	16'	To the E. Prop. Line	16'	80%	Min. asym.	GBS/GSE	Healthy	Serpentine	Partially exposed	-	Base is app. 6 feet south of south side of sidewalk.	Non-Significant	Fair	Viable	Potential to retain with Tree Protection Measures

ATTACHMENT 3 - GLOSSARY

Terms Used in This Report, on the Tree Condition / Inventory Spreadsheet, and Their Significance

In an effort to clearly present the information for each tree in a manner that facilitates the reader's ability to understand the conclusions I have drawn for each tree, I have collected the information in a spreadsheet format. This spreadsheet was developed by Gilles Consulting based upon the *Tree Risk Assessment in Urban Areas and the Urban/Rural Interface* course manual and the *Tree Risk Assessment Form,* both sponsored by the Pacific Northwest Chapter of the International Society of Arboriculture, and the *Hazard Tree Evaluation Form* from the book, *The Evaluation of Hazard Trees in Urban Areas,* by Matheny and Clarke. The descriptions were left brief on the spreadsheet in an effort to include as much pertinent information as possible, to make the report manageable, and to avoid boring the reader with infinite levels of detail. However, a review of these terms and descriptions will allow the reader to rapidly move through the report and understand the information.

1) **PROPERTY**—Whether the tree is on or off the Subject Property, or a Right-of-Way tree.
2) **TREE LOCATION**—Relative placement of the tree.
3) **TREE #**—the unique tag number of each tree.
4) **SPECIES**—this describes the species of each tree with both most readily accepted common name and the officially accepted scientific name.
5) **DBH**—Diameter Breast Height. This is the standard measurement of trees taken at 4.5 feet above the average ground level of the tree base.
    i) Occasionally it is not practical to measure a tree at 4.5 feet above the ground. The most representative area of the trunk near 4.5 feet is then measured and noted on the spreadsheet. For instance, a tree that forks at 4.5 feet can have an unusually large swelling at that point. The measurement is taken below the swelling and noted, e.g. '28.4" at 36"'.
    ii) Trees with multiple stems are listed as a "clump of x," with x being the number of trunks in the clump. Measurements may be given as an average of all the trunks, or individual measurements for each trunk may be listed.
        (1) Every effort is made to distinguish between a single tree with multiple stems and several trees growing close together at the bases.
6) **DRIP LINE**—the radius, the distance from the trunk to the furthest branch tips.
7) **LIMITS OF DISTURBANCE**— The boundary between the area of minimum protection around a tree and the allowable site disturbance as determined by a qualified professional. Distances from the center of the trunk were derived on a case by case basis looking at the unique circumstances of each property and each tree on that property.
8) **% LCR**—Percentage of Live Crown Ratio. The relative proportion of green crown to overall tree height. This is an important indication of a tree's health. If a tree has a

high percentage of Live Crown Ratio, it is likely producing enough photosynthetic activity to support the tree. If a tree has less than 30% to 40% LCR, it can create a shortage of needed energy and can indicate poor health and vigor.

9) **SYMMETRY**—is the description of the form of the canopy, i.e., the balance or overall shape of the canopy and crown. This is the place I list any major defects in the canopy shape, e.g. does the tree have all its foliage on one side or in one unusual area? Symmetry can be important if there are additional defects in the tree such as rot pockets, cracks, loose roots, weak crown, etc. Symmetry is generally categorized as Generally Symmetrical, Minor Asymmetry or Major Asymmetry:
    i) Gen. Sym.—Generally Symmetrical. The canopy/foliage is generally even on all sides with spacing of scaffold branches typical for the species, both vertically and radially.
    ii) Min. Asym.—Minor Asymmetry. The canopy/foliage has a slightly irregular shape with more weight on one side, but appears to be no problem for the tree.
    iii) Maj. Asym.—Major Asymmetry. The canopy/foliage has a highly irregular shape for the species with the majority of the weight on one side of the tree. This can have a significant impact on the tree's stability, health and hazard potential—especially if other defects are noted such as cracks, rot, or root defects.
10) **FOLIAGE/BRANCH**—describes the foliage of the tree in relation to a perfect specimen of that particular species. First the branch growth and foliage density is described, and then any signs or symptoms of stress and/or disease are noted. The condition of the foliage, or the branches and buds for deciduous trees in the dormant season, are important indications of a tree's health and vigor.
    i) For Deciduous trees in the dormant season:
        (1) The structure of the deciduous tree is visible.
        (2) The quantity and quality of buds indicates health, and is described as good bud set, average bud set, or poor bud set. These are abbreviated in the spreadsheet as: gbs, abs, or PBS.
        (3) The amount of annual shoot elongation is visible and is another major indication of tree health and vigor. This is described as:
            a) Excellent, Good, Average, or Short Shoot Elongation. These are abbreviated in the spreadsheet as ESE, GSE, ASE, or SSE.
    ii) For evergreen trees year round and deciduous trees in leaf, the color and density of the foliage indicates if the tree is healthy or stressed, or if an insect infestation, a bacterial, fungal, or viral infection is present. Foliage is categorized on a scale from:
        (1) Dense—extremely thick foliage, an indication of healthy vigorous growth,
        (2) Good—thick foliage, thicker than average for the species,
        (3) Normal/Average—thick foliage, average for the species, an indication of healthy growth,
        (4) Thin or Thinning—needles and leaves becoming less dense so that sunlight readily passes through; an indication that the tree is under

serious stress that could impact the long-term survivability and safety of the tree,

(5) Sparse—few leaves or needles on the twigs, an indication that the tree is under extreme stress and could indicate the future death of the tree,

(6) Necrosis—the presence of dead twigs and branchlets. This is another significant indication of tree health. A few dead twigs and branches are reasonably typical in most trees of size. However, if there are dead twigs and branchlets all over a certain portion of the tree, or all over the tree, these are indications of stress or attack that can have an impact on the tree's long-term health.

(7) Hangers—a term to describe a large branch or limb that has broken off but is still hanging up in the tree. These can be particularly dangerous in adverse weather conditions.

11) **CROWN CONDITION**—the crown is uppermost portion of the tree, generally considered the top 10 to 20% of the canopy or that part of the canopy above the main trunk in deciduous trees and above the secondary bark in evergreen trees.

i) The condition of the tree's crown is a reflection of the overall health and vigor of the entire tree. The crown is one of the first places a tree will demonstrate stress and pathogenic attack such as root rot.

ii) If the **Crown Condition** is healthy and strong, this is a good sign. If the crown condition is weak, broken out, or shows other signs of decline, it is an indication that the tree is under stress. It is such an important indication of health and vigor that this is the first place a trained forester or arborist looks to begin the evaluation of a tree. Current research reveals that, by the time trees with root rot show significant signs of decline in the crown, fully 50% or more of the roots have already rotted away. **Crown Condition** can be described as:

(1) Healthy Crown—exceptional growth for the species.

(2) Average Crown—typical for the species.

(3) Weak Crown—thin spindly growth with thin or sparse needles.

(4) Flagging Crown—describes a tree crown that is weak and unable to grow straight up.

(5) Dying Crown—describes obvious decline that is nearing death.

(6) Dead Crown—the crown has died due to pathological or physical injury. The tree is considered to have significant stress and/or weakness if the crown is dead.

(7) Broken out—a formerly weak crown condition that has been broken off by adverse weather conditions or other mechanical means.

(8) Regenerated or Regenerating—formerly broken out crowns that are now growing back. Regenerating crowns may appear healthy, average, or weak and indicate current health of the tree.

(9) Suppressed—a term used to describe poor condition of an entire tree or just the crown. Suppressed crowns are those that are entirely below the general level of the canopy of surrounding trees which receive no direct sunlight. They are generally in poor health and vigor.

Suppressed trees are generally trees that are smaller and growing in the shade of larger trees around them. They generally have thin or sparse needles, weak or missing crowns, and are prone to insect attack as well as bacterial and fungal infections.

12) **TRUNK**—this is the area to note any defects that can have an impact on the tree's stability or hazard potential. Typical things noted are:
    i) FORKED—bifurcation of branches or trunks that often occur at a narrow angle.
    ii) INCLUDED BARK—a pattern of development at branch or trunk junctions where bark is turned inward rather than pushed out. This can be a serious structural defect in a tree that can and often does lead to failure of one or more of the branches or trunks, especially during severe, adverse weather conditions.
    iii) EPICORMIC GROWTH—this is generally seen as dense thick growth near the trunk of a tree. Although this looks like a healthy condition, it is, in fact the opposite. Trees with Epicormic Growth have used their reserve stores of energy in a last ditch effort to produce enough additional photosynthetic surface area to produce more sugars, starches and carbohydrates to support the continued growth of the tree. Generally speaking, when conifers in the Pacific Northwest exhibit heavy amounts of Epicormic Growth, they are not producing enough food to support their current mass and are already in serious decline.
    iv) INTERNAL STRUCTURAL WEAKNESS—a physical characteristic of the tree trunk, such as a **kink, crack, rot pocket, or rot column** that predisposes the tree trunk to failure at the point of greatest weakness.
    v) BOWED—a gradual curve of the trunk. This can indicate an Internal Structural Weakness or an overall weak tree. It can also indicate slow movement of soils or historic damage of the tree that has been corrected by the curved growth.
    vi) KINKED—a sharp angle in the tree trunk that indicates that the normal growth pattern is disrupted. Generally this means that the internal fibers and annual rings are weaker than straight trunks and prone to failure, especially in adverse weather conditions.
    vii) GROUND FLOWER—an area of deformed bark near the base of a tree trunk that indicates long-term root rot.
13) **ROOT COLLAR**—this is the area where the trunk enters the soil and the buttress roots flare out away from the trunk into the soil. It is here that signs of rot, decay, insect infestation, or fungal or bacterial infection are noted. **NAD** stands for **N**o **A**pparent **D**efects.
14) **ROOTS**—any abnormalities such as girdling roots, roots that wrap around the tree itself that strangle the cambium layer and kill the tree, are noted here.
15) **COMMENTS**—this is the area to note any additional information that would not fit in the previous boxes or attributes about the tree that have bearing on the health and structure of the tree.

16) **STATUS—**In the City of Redmond trees in poor health and/or structure, and tress 5.9-inches in diameter, DBH, are rated as *Non-Significant.* Trees 6.0 inches to 29.9-inches diameter DBH in good health and structure, are rated as *Significant Trees.* Trees in good health and structure that measure 30.0 inches in diameter DBH, are rated as *Landmark Trees.* Each of these three designations carries with it varying degrees of protection and retention requirements.
17) **CURRENT HEALTH RATING**—A description of the tree's general health ranging from dead, dying, poor, senescent, suppressed, fair, good, very good, to excellent.
18) **VIABILITY—**Generally, trees given a *Current Health Rating* Fair, Good, Very Good, or Excellent are *Viable Trees.*
19) **RECOMMENDATION**— this is an estimate of whether or not the tree is of sufficient health, vigor, and structure that it is worth retaining. Specific recommendations for each tree are included in this column. They may include anything from pruning dead wood, mulching, aerating, injecting tree-based fertilizer into the root system, shortening into a habitat tree or wildlife snag, or to completely removing the tree.
    i) **Potential to retain with tree protection measures:** means that the tree appears to have the internal resources, the health and vigor, structural stability, and the wind firmness to be able to withstand the stresses of construction if development requirements and construction requirements allow.
    ii) **Remove:** means that the tree has a high potential to fail and cause either personal injury or property damage—in other words the tree has been declared a hazard tree and should be dealt with prior to the next large storm. If it is at all possible the recommendation is to leave some of the trunk standing for wildlife habitat and some of the trunk on the ground as a nurse log. The height of the standing habitat tree depends upon the size of the tree, the condition of the tree, and the distance to a probable target. It should be short enough so that when it does fail years in the future it will not cause personal injury or property damage. Nurse logs can be laid horizontally across the slope to aid with erosion control and to provide microenvironments for new plantings. The nurse logs meaning to be steak to prevent their movement and potential harm to people. If for some reason this is not possible that should be removed for safety.

NOTE: TREES WITH THE SAME DESCRIPTION AND DIFFERENT RATINGS: Two trees may have the same descriptions in the matrix boxes, one may be marked "Significant," while another may be marked "Non-Significant." The difference is in the degree of the description, i.e., "early necrosis" versus "advanced necrosis" for instance. Another example is "center rot" or 'base rot". In a Western Red Cedar tree, the presence of low or even moderate rot is not significant and does not diminish the strength of the tree. However, low levels of rot in the base of a Douglas Fir tree, in an area known to have virulent pathogens present, is highly significant and predisposes that tree to windthrow.

ATTACHMENT 4 - TREE PROTECTION MEASURES

In order for trees to survive the stresses placed upon them in the construction process, tree protection must be planned in advance of equipment arrival on site. If tree protection is not planned integral with the design and layout of the project, the trees will suffer needlessly and will possibly die. With proper preparation, often costing little, or nothing extra to the project budget, trees can survive and thrive after construction. This is critical for tree survival because damage prevention is the single most effective treatment for trees on construction sites. Once trees are damaged, the treatment options available are limited.

The following minimum Tree Protection Measures are included on five separate sheets so that they can be copied and introduced into all relevant documents such as site plans, permit applications and conditions of approval, and bid documents so that everyone involved is aware of the requirements. These Tree Protection Measures are intended to be generic in nature. They will need to be adjusted to the specific circumstances of your site that takes into account the location of improvements and the locations of the trees.

TREE PROTECTION MEASURES

1. Tree Protection Fencing:
    a. Tree Protection Fences will need to be placed around each tree or group of trees to be retained.
        i. Tree Protection Fences are to be placed according to the attached drawing at a distance of not less than 5 feet outside the dripline of the tree or group of trees to be saved.
        ii. Tree Protection Fences must be inspected prior to the beginning of any demolition or construction work activities.
        iii. Nothing must be parked or stored within the Tree Protection Fences—no equipment, vehicles, soil, debris, or construction supplies of any sorts.
    b. The area inside the *Tree Protection Fence* is considered the *Tree Protection Zone* and is bound by i – iii above.
    c. The area outside the *Tree Protection Fence* is the *Work or Development Zone*.

    d. Signs:
        i. The Tree Protection Fences need to be clearly marked with the following or similar text in four inch or larger letters:

"TREE PROTECTION FENCE
DO NOT ENTER THIS AREA
DO NOT PARK OR STORE MATERIALS
WITHIN THE PROTECTION AREA

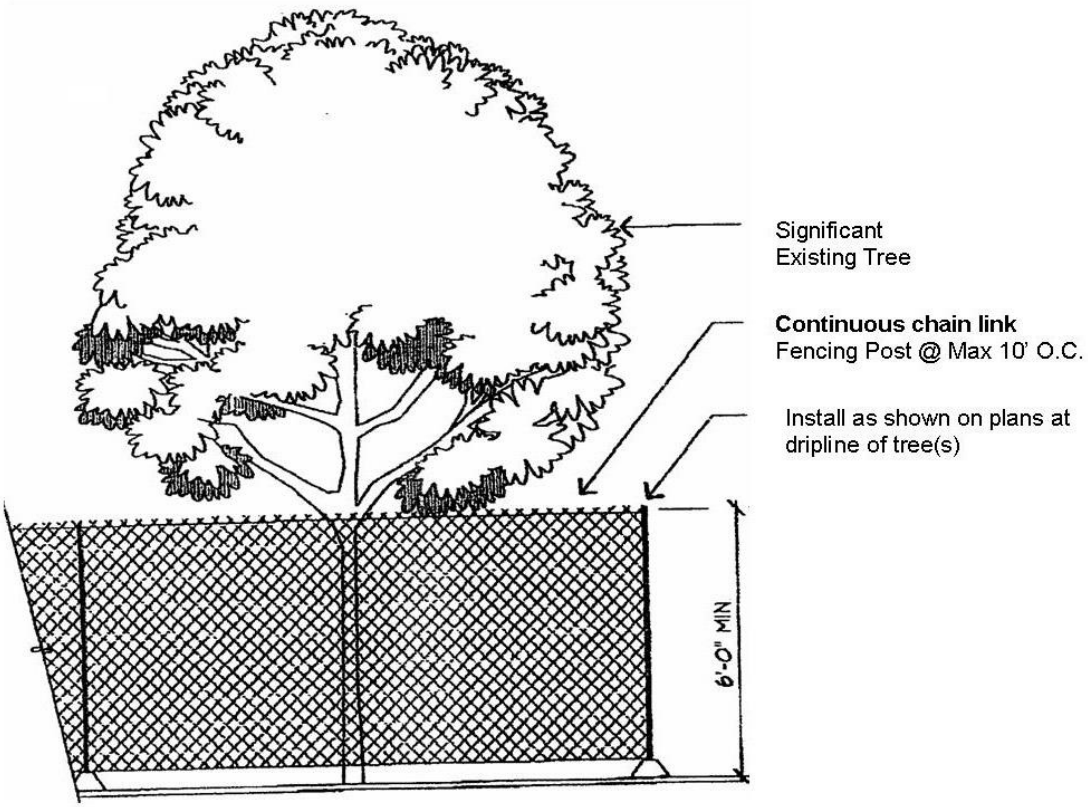
Any questions, contact Redmond Code Enforcement
codeenforcement@redmond.gov

425-556-2474"

2. Cement Trucks:
    a. Cement trucks must not be allowed to deposit waste or wash out materials from their trucks within the Tree Protection Fences.

3. Canopy Pruning:
    a. If any canopies need pruning for construction clearance the pruning must be done by an International Society of Arboriculture, (ISA) Certified Arborist using current industry standard pruning techniques. (ANSI A300 Pruning Standards and ANSI Z131.1 Safety Standards as well as all OSHA, WISHA, and local standards must be followed.)
    b. Plant debris can be chipped and utilized on site for the mulch under the trees.

5. Putting Utilities Under the Root Zone:
    a. Boring under the root systems of trees (and other vegetation) shall be done under the supervision of an ISA Certified Arborist. This is to be accomplished by excavating a limited trench or pit on each side of the critical root zone of the tree and then hand digging or pushing the pipe through the soil under the tree. The closest pit walls shall be a minimum of 7 feet from the center of the tree and shall be sufficient depth to lay the pipe at the grade as shown on the plan and profile.
    b. Tunneling under the roots of trees shall be done under the supervision of an ISA Certified Arborist in an open trench by carefully excavating and hand digging around areas where large roots are exposed. No roots 1 inch in diameter or larger shall be cut.
    c. The contractor shall verify the vertical and horizontal location of existing utilities to avoid conflicts and maintain minimum clearances; adjustment shall be made to the grade of the new utility as required.



Six-foot high temporary chain link fence shall be placed as shown on plans. Fence shall completely encircle tree(s). Install fence posts using pier blocks only. Avoid driving posts or stakes into major roots.

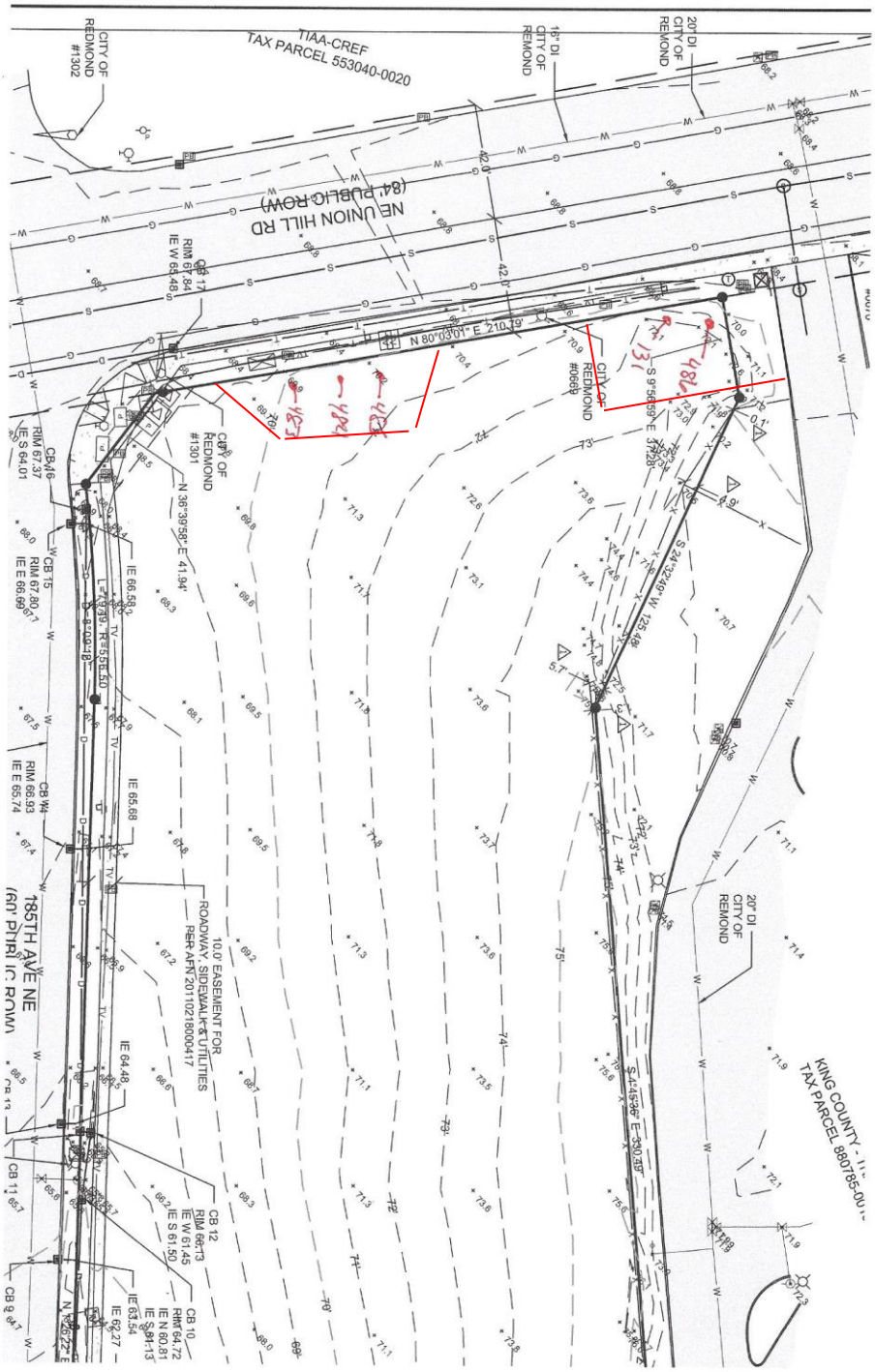
Make a clean straight cut to remove damaged portion of root for all roots over 1" in diameter damaged during construction. ***All*** exposed roots shall be temporarily covered with damp burlap and covered with soils the same day, if possible, to prevent drying. If not possible, burlap must be kept moist at all times.

Work with the protection fencing shall be done manually. No stockpiling of materials, soil, debris, vehicle traffic, or storage of equipment or machinery shall be allowed within the limit of the fencing.

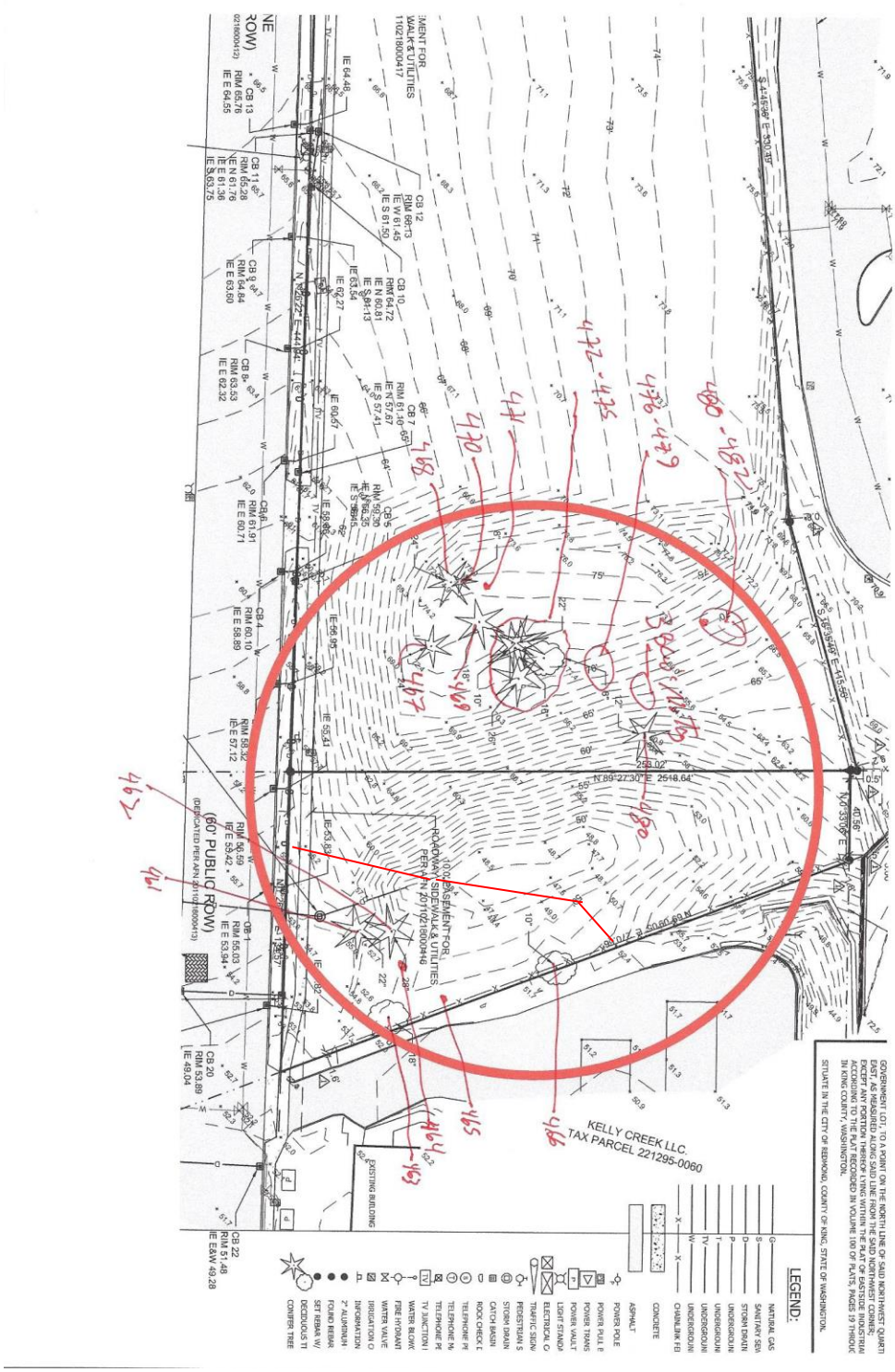
Cement trucks must not be allowed to deposit waste or wash out materials from their trucks within the Tree Protection Fences.

The area within the Tree Protection Fencing must be covered with wood chips, hog fuel, or similar materials to a depth of 8 to 10 inches. The materials should be placed prior to beginning construction and remain until the Tree Protection Fencing is taken down.

Approximate Tree Protection Fence Locations



Approximate Tree Protection Fence Locations



ATTACHMENT 5 - REFERENCES

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